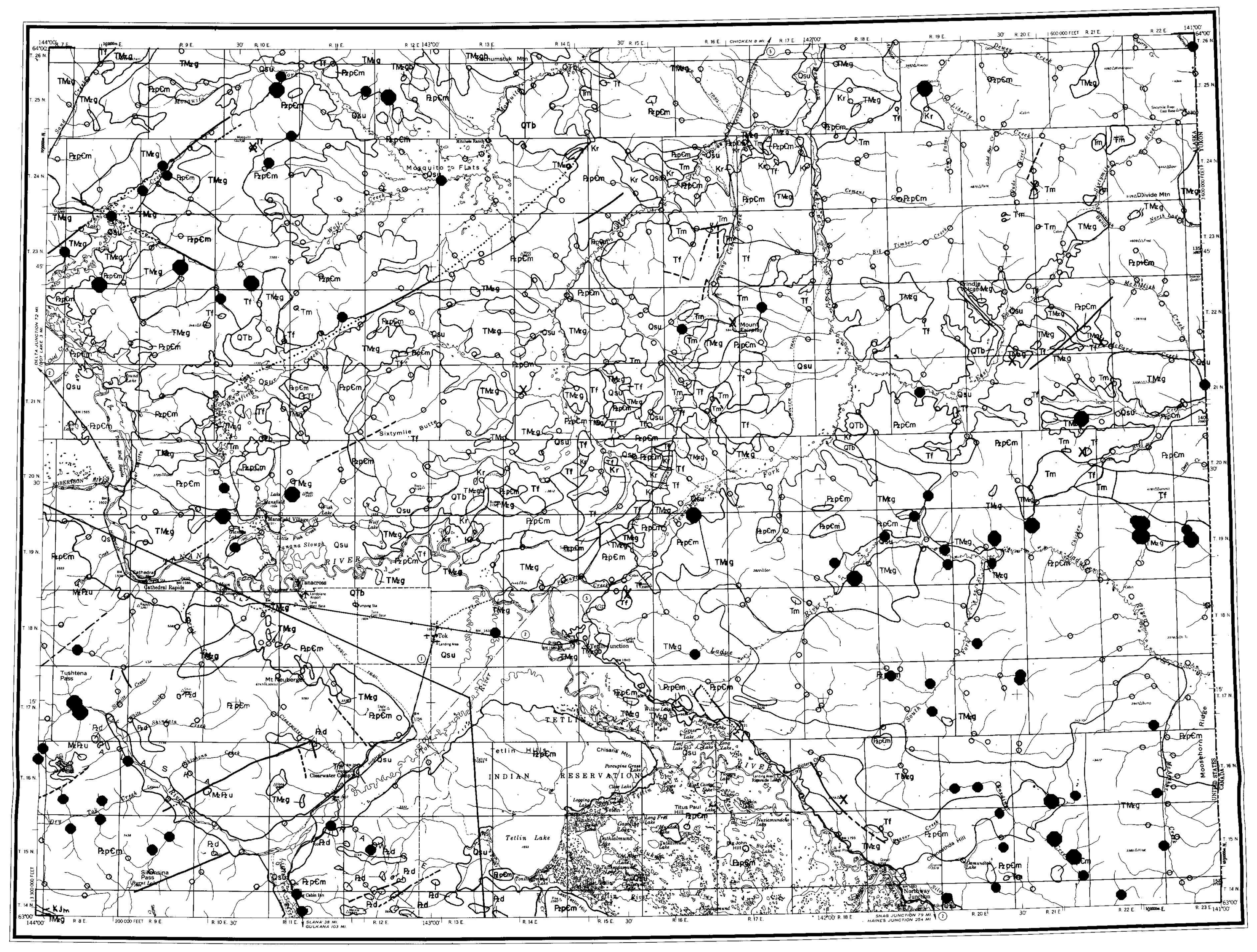
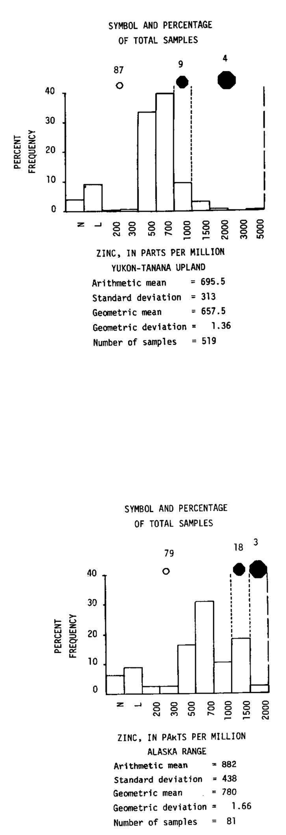
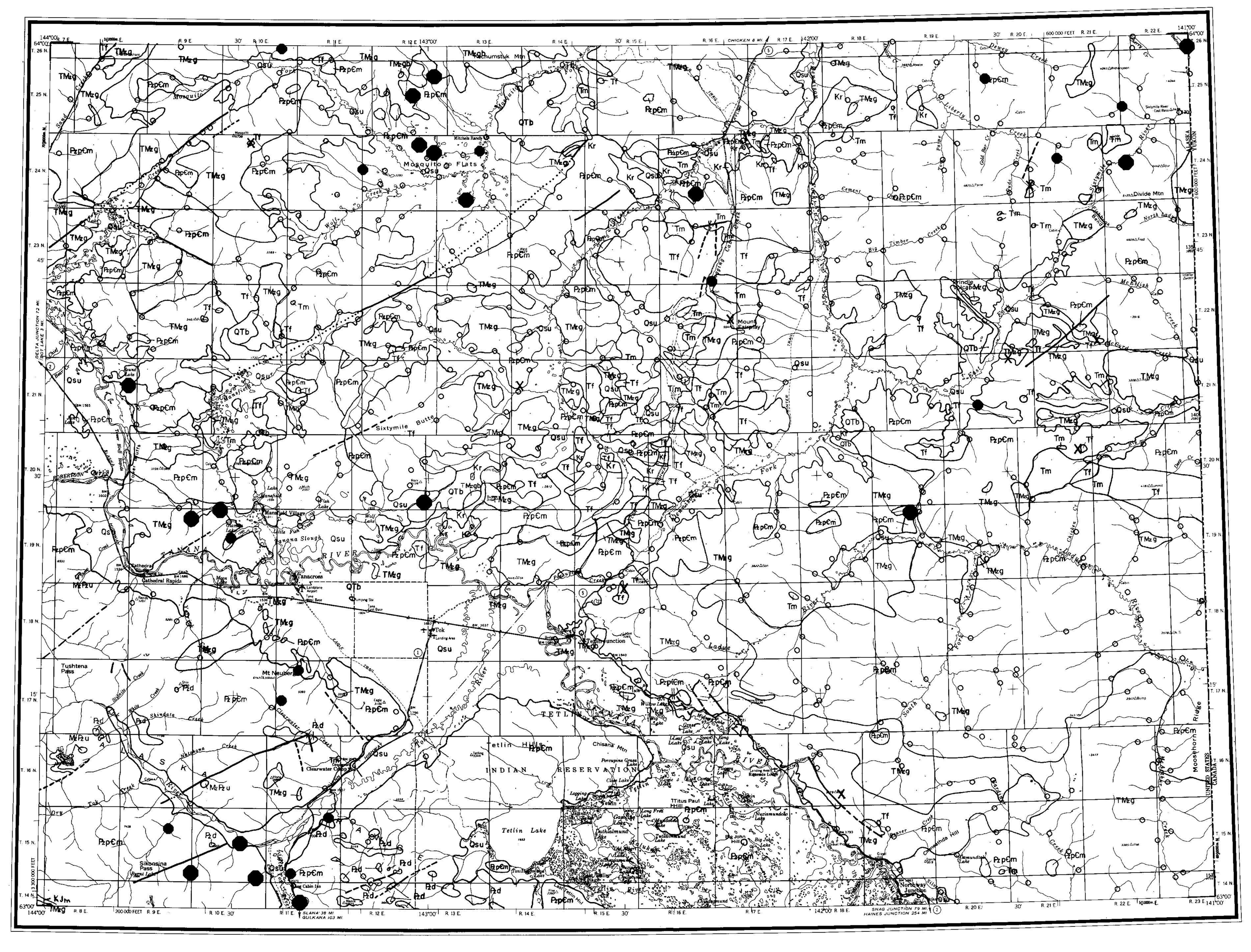
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

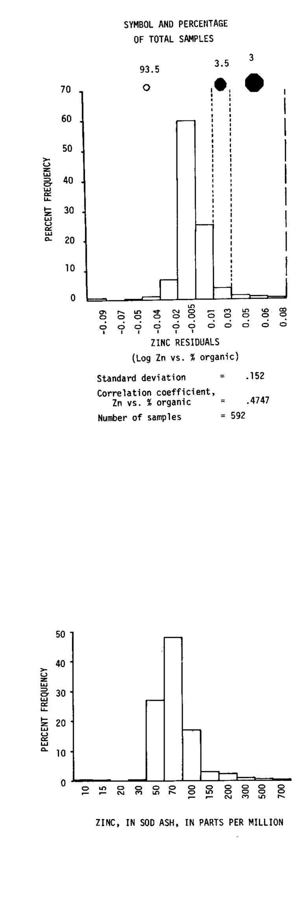
FOLIO OF THE TANACROSS QUADRANGLE, ALASKA
MAP MF-767 I
CURTIN AND OTHERS--GEOCHEMICAL MAP, ZINC



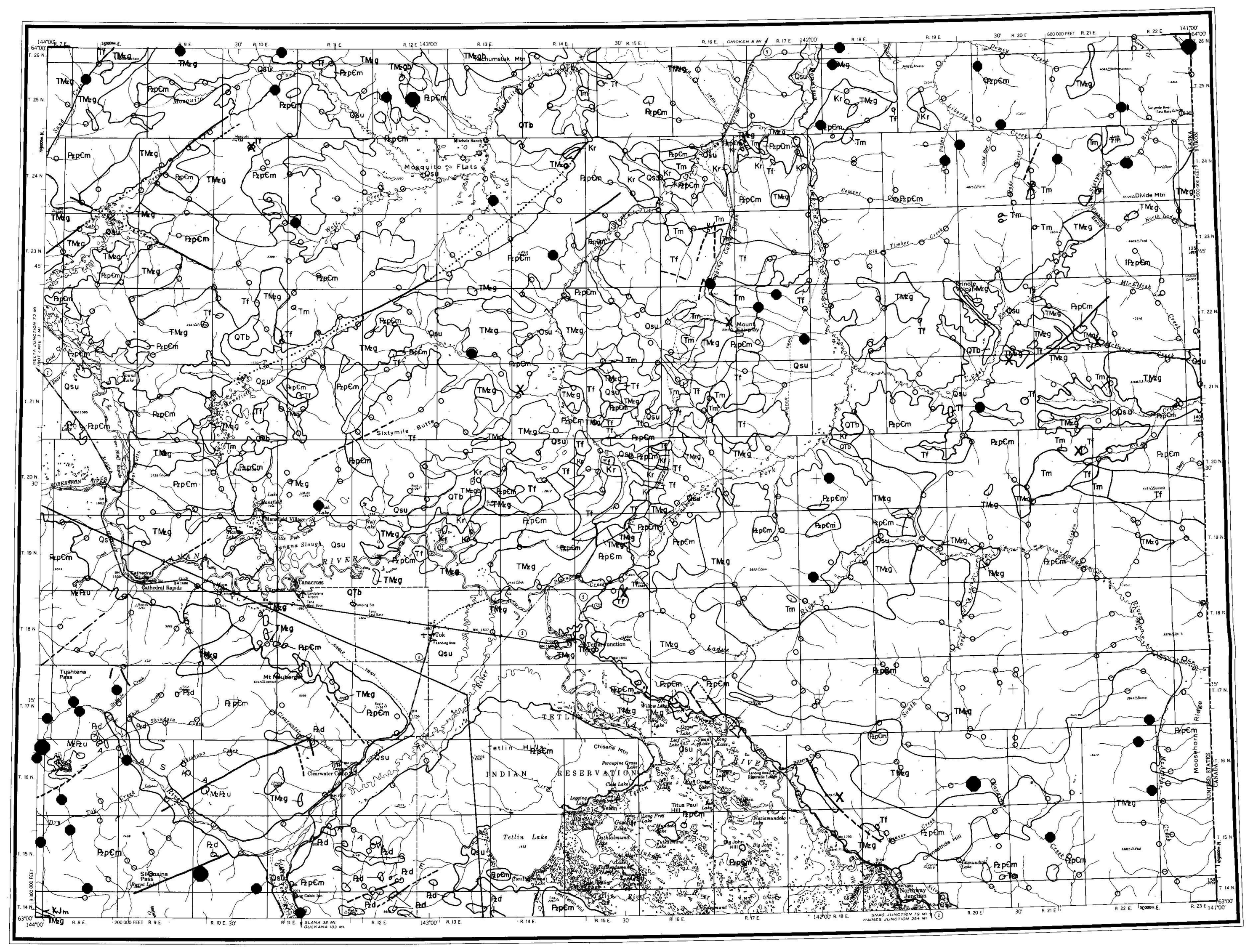


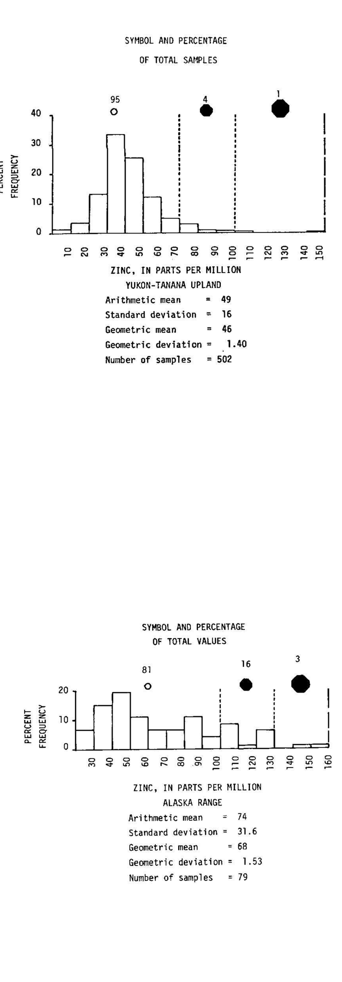
A. Zinc in the oxide residue of stream sediment



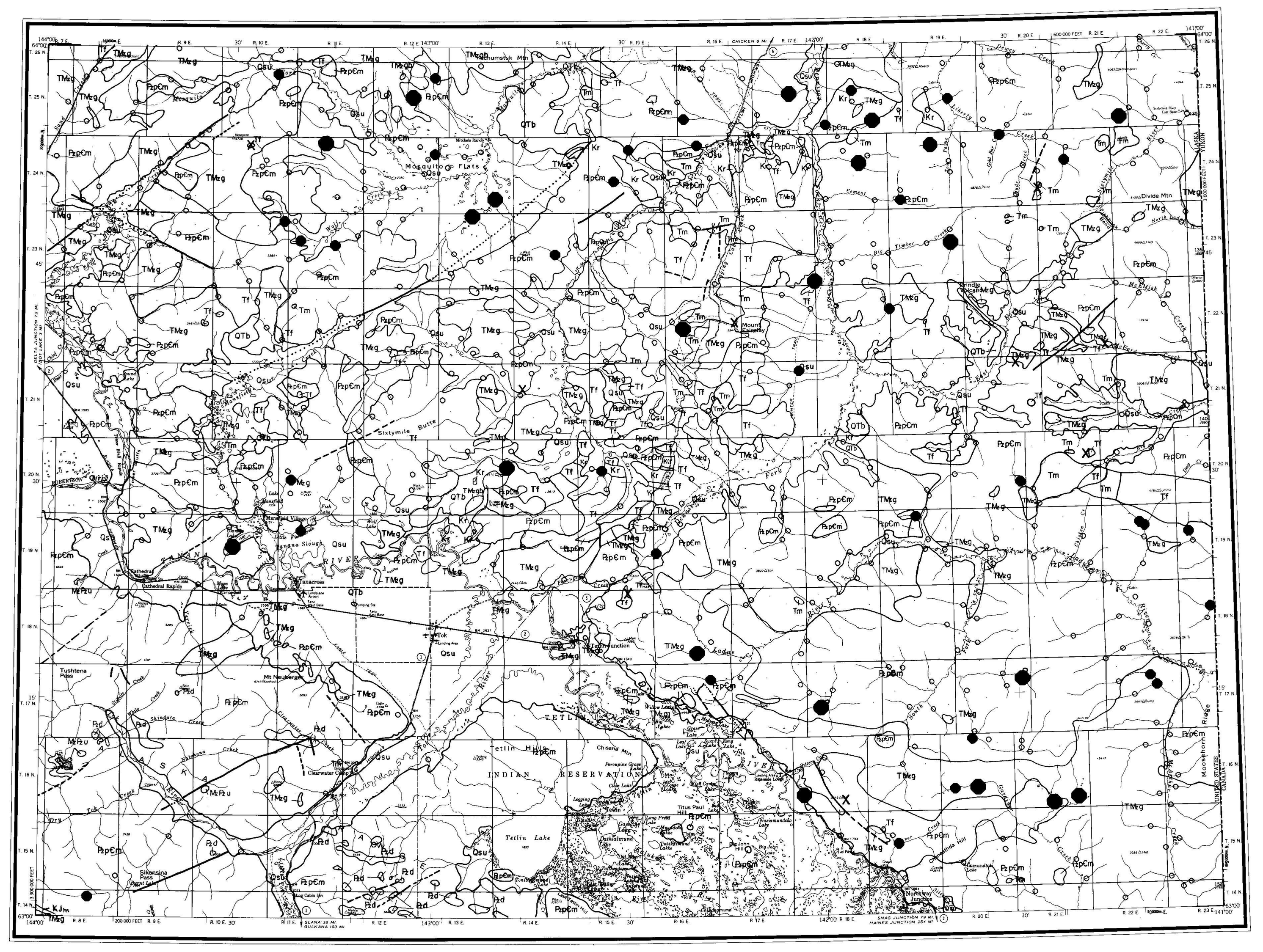


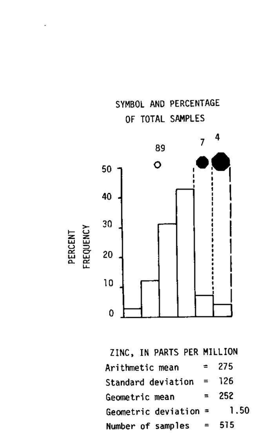
C. Zinc in the ash of streambank sod





B. Zinc in the minus-80-mesh stream sediment





D. Zinc in the ash of aquatic bryophytes (mosses)

EXPLANATION

GEOLOGY GENERALIZED FROM FOSTER (1970)

CORRELATION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qsu — QUATERNARY

SEDIMENTARY ROCKS

Kr — CRETACEOUS(?)

KJm — CRETACEOUS OR JURASSIC

IGNEOUS AND METAMORPHIC ROCKS

QTb — QUATERNARY AND TERTIARY

Tm, Tf — TERTIARY(?)

TMzg, TMzgb — TERTIARY OR MESOZOIC

MzPzu — MESOZOIC OR PALEOZOIC

Pzd — PALEOZOIC(?)

Pzp€m — PALEOZOIC AND (OR) PRECAMBRIAN

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qsu — UNCONSOLIDATED SEDIMENTARY DEPOSITS

SEDIMENTARY ROCKS

Kr — DETRITAL ROCKS (CRETACEOUS?)

KJm — MENTASTA ARGILLITE OF RICHTER (1967) (JURASSIC OR CRETACEOUS)

IGNEOUS AND METAMORPHIC ROCKS

QTb — BASALT

Tm — MAFIC VOLCANIC ROCKS

Tf — FELSIC TUFF, WELDED TUFF, LAVA, AND HYPABYSSAL INTRUSIVE ROCKS

TMzg — GRANITIC ROCKS, UNDIVIDED

TMzgb — GABBRO

MzPzu — ULTRAMAFIC ROCKS

Pzd — DIORITE

Pzp€m — METAMORPHIC ROCKS, UNDIVIDED

GEOLOGIC SYMBOLS

CONTACT, APPROXIMATELY LOCATED

FAULT, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED. U, UPTHROWN SIDE; D, DOWNTHROWN SIDE

FAULT OR LINEAMENT FROM AERIAL PHOTOGRAPHS

LINE SEPARATES NORTHERN (YUKON-TANANA UPLAND) POPULATION OF GEOCHEMICAL SAMPLES FROM SOUTHERN (ALASKA RANGE) POPULATION

X BASE METAL PROSPECTS NORTH OF THE TANANA RIVER

GEOCHEMICAL SYMBOLS

○ BACKGROUND VALUES

⬢ WEAKLY ANOMALOUS VALUES

⬢ STRONGLY ANOMALOUS VALUES

DISCUSSION

This series of geochemical maps shows the distribution of zinc in four sample media: (A) the oxide residue (oxalic-acid-leachable fraction) of the stream sediment, (B) the minus-80-mesh stream sediment, (C) the ash of streambank sod (mixed organic and inorganic material) collected beneath the water level, and (D) the ash of aquatic bryophytes (mosses). The map symbols show sample sites and ranges of values in the following manner: (1) open symbols denote background, (2) small black symbols represent weakly anomalous values, and (3) large black symbols denote strongly anomalous values. Because the small black symbols represent weakly anomalous values, we consider them to be significant only where they correlate with strongly anomalous metal values either in the same or in other sample media. The ranges of values represented by the symbols are shown on the histograms that accompany the geochemical maps. An explanation of sampling, preparation, and analytical procedures is given in Circular 734, which accompanies the folio. Complete analytical data for geochemical samples collected by the U.S. Geological Survey in the Tanacross quadrangle are available in a U.S. Geological Survey open-file report (O'Leary and others, 1976).

Of the four sample media, the oxide residue (mainly secondary iron-manganese oxides) of stream sediment and the aquatic bryophytes act as scavenging agents of ions in solution in the stream waters. The zinc content of these media, therefore, is indicative of the amounts of zinc migrating in solution from bedrock and colluvium. The zinc content of the streambank sod represents both zinc scavenged from solution primarily by the organic material and the zinc content of the detrital material in the sod. The zinc content of the minus-80-mesh stream sediment, on the other hand, mainly represents the amount of zinc in the detrital material of the stream sediment.

Zinc values in the ash of streambank sod show a relatively high positive correlation with the organic content of the sample. This high correlation suggests that the amount of organic material noticeably influences the zinc content of the sod. A regression analysis--log zinc vs. organic content--was used to determine the influence of organic content on the variation of zinc values in the ash of the sod. This type of analysis allows separation of those high zinc values that reflect the concentration of background amounts of zinc by organic material from those high values that are derived from a mineralized source. Values from the regression analysis, shown as residuals, were used on the geochemical map (fig. C). The distribution of the residuals is shown on the upper of the two accompanying histograms. The lower histogram shows the distribution of original zinc concentrations in the ash of the streambank sod.

The zinc values in the ash of aquatic bryophytes were not adjusted on the basis of percent of organic material because the organic content of the bryophytes shows little variation.

The histograms and other statistical data for zinc in the oxide residue of stream sediment (fig. A) and in the minus-80-mesh stream sediment (fig. B) show two populations. For each medium, one population (generally lower values) represents the zinc content of the samples collected in the maturely dissected, forested terrain of the Yukon-Tanana Upland--that part of the quadrangle north of the Tanana River. The other population of generally higher zinc values represents samples collected in the rugged, mountainous terrain of the Alaska Range--south and west of the heavy black line on the map. In the maturely dissected terrain, chemical weathering is probably the main factor controlling the mobility of zinc. This type of weathering may be characterized by the solution of unstable minerals such as sulfides and a general dispersion and impoverishment of zinc and other base metals in the weathering zone. In the rugged mountainous terrain, on the other hand, mechanical weathering is the primary process controlling element mobility. In this environment, impoverishment of metals in the weathering zone due to chemical processes is a minor factor.

The zinc distribution patterns shown on the accompanying maps reveal several areas where zinc values are anomalously high in one of the sample media and are supported, in part, by high zinc values in at least one other sample medium. These correlations suggest the presence of anomalous amounts of zinc in the bedrock within the anomalous areas.

In the northwest part of the quadrangle, anomalous zinc values in the oxide residue of stream sediment suggest the presence of additional occurrences of mineralized rock. Here, zinc may be migrating in solution from mineralized zones and then scavenged by the secondary iron-manganese oxides in the stream sediment. In this area the high zinc values correlate, in part, with anomalously high molybdenum and lead values in the oxide residue (Curtin, Day, Carten, Marsh, and Tripp, 1976; Curtin and others, 1976b), and with high bismuth and tungsten values in the nonmagnetic fraction of heavy-mineral concentrates (Tripp and others, 1976).

The lack of abundant high zinc values in the minus-80-mesh stream sediment in the northwest part of the quadrangle indicates that outcropping bedrock is not supplying noticeable quantities of zinc-rich clastic material to the streams. This indicates either that the zinc has been removed from the surface or near-surface bedrock by weathering or that the surface and near-surface bedrock is barren and the zinc in the scavenging media has migrated in solution from concealed mineralized rock.

Clusters of high zinc values in the oxide residue of stream sediment outline two additional anomalous areas in the eastern part of the quadrangle. One area forms an east-west linear zone near the east-central part of the quadrangle; the other cluster outlines a large anomalous area near the southeast corner of the quadrangle. Scattered weakly anomalous zinc values between the two clusters also suggest the presence of zinc-bearing bedrock. Scattered high zinc values in moss ash and in minus-80-mesh stream sediment correlate in part with the high zinc values in the oxide residue in the anomalous area near the southeast corner of the quadrangle. The presence of high zinc values in the oxide residue (fig. A) and in the ash of aquatic bryophytes (fig. D) indicates that the anomalies are primarily hydromorphic. However, the scattered high zinc values in the minus-80-mesh stream sediment (fig. B) indicate that rock outcrop is contributing zinc-bearing detrital material to the streams in several areas.

High zinc values in the ash of streambank sod (fig. C) outline an anomalous area north of and within Mosquito Flats. These high values and scattered anomalous zinc values in moss ash in the same general area indicate that zinc is migrating in solution from occurrences of mineralized rock.

A relatively small anomalous zinc area near the west-central part of the quadrangle is indicated by scattered high zinc values in the oxide residue, sod ash, and the ash of aquatic bryophytes (figs. A, C, D). These anomalous values roughly correlate with anomalous copper, lead, molybdenum, and arsenic values (Curtin and others, 1976a, b; Curtin, Day, Carten, Marsh, and Tripp, 1976; Curtin, O'Leary, and Carten, 1976) in the various sample media.

There is a general correlation of anomalous zinc values between the minus-80-mesh stream sediment (fig. B) and the ash of aquatic mosses (fig. D) in the northeast part of the quadrangle. Several scattered high zinc values in sod ash (fig. C) and one high value in oxide residue (fig. A) also correlate with the other anomalous zinc values in this area. The weakly anomalous zinc values in the minus-80-mesh stream sediment (fig. B) suggests that outcropping or near-surface zinc-rich zones exist in this area.

In the terrain north of the Tanana River, six base metal prospects are not accompanied by high zinc values in the four sample media. These prospects are located in T. 24 N., R. 10 E.; T. 21 N., R. 14 E.; T. 22 N., R. 16 E.; T. 18 N., R. 15 E.; T. 21 N., R. 20 E.; and T. 22 N., R. 21 E. The absence of anomalous zinc values around these prospects indicates that either the zinc content of the altered and mineralized rock of the prospects is low or that the amount of mineralized rock is too small to produce zinc-bearing dispersion trains that could be detected at the sampling density used in this study.

High zinc values in the Alaska Range in the southwest part of the quadrangle (figs. A and B) probably reflect the presence of zinc in small mineralized shear zones and veins that are known to occur there.

The results of the geochemical sampling demonstrate that zinc occurrences are more completely defined by the use of a combination of sample media than by any one of the sample media when used alone.

Patterns defining areas of zinc potential are shown on the composite geochemical map of lead and zinc distribution (Curtin, Day, O'Leary, Tripp, and Carten, 1976) which is included in this folio.

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_____1976b, Geochemical maps showing the distribution and abundance of lead in the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-767H, 1 sheet, scale 1:500,000.

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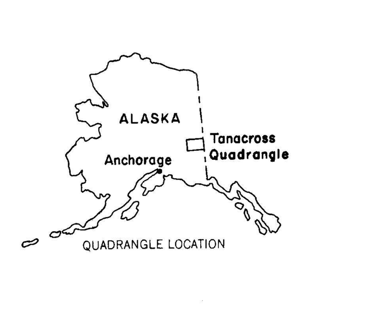
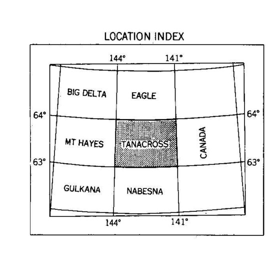
BASE FROM U. S. GEOLOGICAL SURVEY, 1:250,000, TANACROSS QUADRANGLE, 1964

Scale 1:500,000
1 inch equals approximately 8 miles





GEOCHEMICAL MAPS SHOWING THE DISTRIBUTION AND ABUNDANCE OF ZINC IN THE TANACROSS QUADRANGLE, ALASKA

BY

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1976

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